SYNTHESIS OF 1,2,3,4-TETRAHYDROXYBENZENES AND 1,2,3-TRIHYDROXYBENZENES USING MYO-INOSITOL-1-PHOSPHATE SYNTHASE AND MYO-INOSITOL 2-DEHYDROGENASE

RELATED APPLICATIONS

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The present invention is a continuation-in-part of U.S. Serial No. 09/274,732, filed March 23, 1999, now abandoned, which is hereby expressly incorporated by reference.

SPONSORSHIP

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FIELD OF THE INVENTION

The present invention is related to the production of 1,2,3,4-tetrahydroxybenzene and more specifically, to methods of producing 1,2,3,4-tetrahydroxybenzene from the bioconversion of a carbon source.

BACKGROUND OF THE INVENTION

Polyhydroxy benzenes and quinones possessing the oxygenation pattern of 1,2,3,4-tetrahydroxybenzene **1** (Figure 1) often display biological activity. Aurantiogliocladin **2** and fumigatin **3** (Figure 1) are antibiotics. Vischer, E.B., *J. Chem. Soc.* 815 (1953); Baker, W. et al., *J. Chem. Soc.* 820 (1953); Baker, W. et al., *J. Chem. Soc.* 670 (1941). Coenzyme $Q_{n=10}$ **4** (Figure 1) is an essential antioxidant in humans protecting low density lipoproteins from atherosclerosis-related oxidative modification. Ingold, K.U. et al., *PNAS (USA)* 90:45 (1993); Stocker, R. et al., *PNAS (USA)* 88:1646 (1991); Steinberg, D., *Circulation* 84:1420 (1991). Dillapiole **5** (Figure 1) is a pyrethrin synergist and is responsible for the sedative effect of *Perilla frutescens* leaves. Honda, G. et al., *Chem. Pharm. Bull.* 36:3153 (1988); Tomar, S.S. et al., *Agric. Biol. Chem.* 50:2115 (1986).

The current method of preparing 1,2,3,4-tetrahydroxybenzene uses pyrogallol as the synthetic starting material. Pyrogallol is converted to aminopyrogallol using a four-step synthesis. Aminopyrogallol is then hydrolyzed to give 1,2,3,4-tetrahydroxybenzene. Conversion of pyrogallol to 1,2,3,4-tetrahydroxybenzene requires the use of such reagents as phosgene, solvents such as pyridine and xylene, and has a nitroaromatic as a synthetic intermediate.

It would also be desirable to provide an improved method for producing derivatives of 1,2,3,4-tetrahydroxybenzene. Particularly, it would be desirable to